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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/516,800	12/06/2004	Gustav Wallmark	CU-4017 RJS/BWH	7317

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EXAMINER	
LEE, JOHN W	

ART UNIT	PAPER NUMBER
2624	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/516,800	WALLMARK ET AL.	
	Examiner	Art Unit	
	John Wahnkyo Lee	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 December 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *22-42* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *22-42* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *06 December 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *20050307*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

1. An initialed and dated copy of Applicant's IDS form 1449-Paper No. 20050307 is attached to the instant Office action.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 22-38 and 40-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sammons et al. (US 5,073,963) in view of Sethian ("A Fast Marching Level Set Method for Monotonically Advancing Fronts").

Regarding claim 22, Sammons discloses a method for segmenting (col. 3, lines 60-66, "segmentation") a 2D gel image (col. 4, lines 53-63, "2-D image" and "2-D gels") by associating initial protein seed candidates (col. 1, lines 30-68, "protein"; claim 13) with surrounding regions (Figs. 6a, 6b, 6c, 7a, 7b, and 7c; claim 14, "background"), comprising the steps of defining at least one interface (Figs. 6a, 6b, 6c, 7a, 7b, and 7c; col. 7, lines 35-49, "spot") circumscribing an initial seed (col. 1, lines 30-68, "protein"; claim 13) in its immediate surrounding (Figs. 6a, 6b, 6c, 7a, 7b, and 7c; claim 14,

"background"). However, Sammons does not disclose rest of the claim limitations, but Sethian does. Sethian discloses defining a velocity function F(x, y) (page 1593, "speed function F(x,y)") for said interface (page 1591, "interface Γ"), bringing said interface (page 1591, "interface Γ") to evolve in accordance with F(x, y) (pages 1592-1593; equations [4]-[7]), defining at least one stopping criterion C (page 1593; equations [7] and [8], "iterates until ... solution") and stopping the evolution (pages 1592-1593; equations [4]-[7]) of said interface (page 1591, "interface Γ") in accordance with said criterion (page 1593; equations [7] and [8], "iterates until ... solution"), associating the area inside said stopped interface with said initial seed (pages 1592-1594; equations [4]-[10]).

It would have been *prima facie* obvious to one of ordinary skill in the art at the time the invention was made to use Sethian's method in Sammons's invention to provide an applicable technique to a variety of problems and fast scheme as suggested by Sethian (abstract).

Regarding claim 23, Sethian further discloses calculating the time of arrival, Ta(x, y) (pages 1593-1594; equations [6]-[10], "T(x,y)") for said evolving (pages 1592-1593; equations [4]-[7]) interface (page 1591, "interface Γ") in pixels (page 1593, "(x,y)") surrounding said initial seed defining said stopping criterion C (page 1593; equations [7] and [8], "iterates until ... solution") so that C (page 1593; equations [7] and [8], "iterates until ... solution") depends on Ta(x, y) (pages 1593-1594; equations [6]-[10], "T(x,y)") in the pixel page 1593, "(x,y)") representing the latest circumscribed pixel by said (pages

1592-1593; equations [4]-[7]) interface (page 1591, "interface Γ") and/or functions thereof (pages 1593-1594; equations [6]-[10]).

Regarding claim 24, Sethian further discloses said stopping criterion C page 1593; equations [7] and [8], "iterates until ... solution") depends on the gradient Ta' (page 1593; equations [7] and [8], "approximation to he gradient") of Ta(x, y) (pages 1593-1594; equations [6]-[10], "T(x,y)") in the pixel (page 1593, "(x,y)") representing the latest circumscribed pixel by said (pages 1592-1593; equations [4]-[7]) interface (page 1591, "interface Γ") and/or functions thereof (pages 1593-1594; equations [6]-[10]).

Regarding claim 25, Sethian discloses wherein said stopping criterion C (page 1593; equations [7] and [8], "iterates until ... solution") is defined so that C(page 1593; equations [7] and [8], "iterates until ... solution") depends on F(x, y) and/or functions thereof (page 1593; equations [7] and [8]).

Regarding claim 26, Sethian further discloses wherein the evolution (pages 1592-1593; equations [4]-[7]) of said interface (page 1591, "interface Γ") is carried out by defining and calculating a time of arrival, Ta(x, y) (pages 1593-1594; equations [6]-[10], "T(x,y)"), for a set of trial candidate pixels (pages 1593-1594, "case 1 and case 2"), identifying the trial candidate pixel P_{Tmin} (pages 1593-1594, "case 1 and case 2") with the smallest Ta (pages 1593-1594, "case 1 and case 2"), and letting the interface evolve to said trial candidate pixel P_{Tmin} (pages 1593-1594, "case 1 and case 2").

Regarding claim 27, Sethian further discloses comprising the step of rejecting a trial candidate pixel as a candidate pixel if it is established that said candidate trial pixel

constitutes a pixel representing a known pixel associated with an evolving interface originating from another initial seed (pages 1593-1594, "narrow band" and "far away").

Regarding claim 28, Sethian further discloses wherein the evolution (pages 1592-1593; equations [4]-[7]) of said interface (page 1591, "interface Γ") is carried out by: an iterative calculation of Ta(x, y) (page 1593; "loop") for a set of candidate pixels (page 1593, "points"), defining and calculating a departure time, Td pages 1594, "$T_{recomputed-from-A}$"), for said candidate pixels, identifying the candidate pixel P_{Td} with the smallest Td, letting the interface propagate to said pixel points, P_{Td}, outside or inside neighbors depending on the sign of the speed function F in said point P_{Td} (pages 1593-1594).

Regarding claim 29, Sethian further discloses comprising the step of rejecting a trial candidate pixel as a candidate pixel if it is established that said trial candidate pixel constitutes a pixel representing a known pixel associated with an evolving interface and that the value of the speed function F(x, y) in said trial candidate pixel is positive (pages 1593-1594).

Regarding claim 30, Sethian further discloses comprising the following steps defining a first function $F_1(x, y)$ (pages 1593-1594; equations [7]-[9]), defining at least a second function $F_2(x,y)$ (page 1593; equation [6]) differing from F.sub.1(x, y), defining a criterion C_2 for at least an amount of pixels inside a region of said image (pages 1592-1593), wherein said criterion C_2 defines weather $F_1(x, y)$ (pages 1593-1594; equations [7]-[9]) or F.sub.2(x, y) (page 1593; equation [6]) differing from F.sub.1(x, y) is valid for said amount of pixels (pages 1592-1593).

Regarding claim 31, Sethian further discloses wherein said criterion C2 (pages 1592-1593; equation [6]) is a criterion for identifying saturated regions (pages 1592-1593).

Regarding claim 32, Sethian further discloses F(x, y) depends on the intensity function I(x, y) for said image and/or functions thereof (pages 1591-1592; equations [1] and [2]).

Regarding claim 33, Sethian further discloses wherein F(x, y) depends on the distance to said initial seed and/or functions thereof (pages 1591-1592; equations [1] and [2]).

Regarding claim 34, Sethian further discloses wherein F(x, y) depends on the curvature of said evolving interface and/or functions thereof (pages 1591-1592; equations [1] and [2]).

Regarding claim 35, Sethian further discloses wherein F(x, y) depends on the normal direction of said evolving interface and/or functions thereof (pages 1591-1592; equations [1] and [2]).

Regarding claim 36, Sethian further discloses wherein F(x, y) depends on the curvature of the intensity function I(x, y) and/or functions thereof (pages 1591-1592; equations [1] and [2]).

Regarding claim 37, Sethian further discloses wherein F(x, y) depends on the gradient G(x, y) of the intensity function I(x, y) for said image and/or functions thereof (pages 1591-1592; equations [1] and [2]).

Regarding claim 38, Sethian further discloses wherein F(x, y) depends on the shape of said evolving interface and/or functions thereof (pages 1591-1592; equations [1] and [2]).

Regarding claim 40, Sammons further discloses a computer program element (Fig. 1-100; abstract, "computerized method ..."; col. 6, lines 58-68) to be used for the segmentation of a 2D gel image by associating initial protein seed candidates with surrounding regions, said program element comprising computer program code means making a computer execute the steps defined by any of above claims 22-39 (Fig. 1-100; abstract, "computerized method ..."; col. 6, lines 58-68).

Regarding claim 41, Sammons further discloses a computer readable medium, comprising computer program code means making a computer execute the steps defined by any of above claims 22-39 (Fig. 1-120b; col. 6, lines 65-68, "random access memory ...").

Regarding claim 42, claim 42 is analogous and corresponds to claim 40. See rejection of 40 for further explanation.

4. Claim 39 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sammons et al. (US 5,073,963) in view of Sethian ("A Fast Marching Level Set Method for Monotonically Advancing Fronts"), and further in view of Makram-Ebeid (US 6,430,315 B1).

Regarding claim 39, Sammons and Sethian disclose all the previous claim limitations except the one specified in claim 39. However, Makram-Ebeid discloses

wherein F(x, y) depends on the angle between the intensity gradient, of I(x, y), and a vector representing the instantaneous distance to (x, y) (col. 3, lines 30-39).

It would have been *prima facie* obvious to one of ordinary skill in the art at the time the invention was made to use Sethian's method and Makram-Ebeid's invention in Sammons's invention to provide an applicable technique to a variety of problems and fast scheme as suggested by Sethian (abstract).

Conclusion

5. No claims are allowed.

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to John Wahnkyo Lee whose telephone number is (571) 272-9554. The examiner can normally be reached on Monday - Friday (Alt.) 7:30 a.m. - 5:00 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jingge Wu can be reached on (571) 272-7429. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business

Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JINGGE WU
SUPERVISORY PATENT EXAMINER

John W. Lee
(AU 2624)